

CLAIMS:

1. A vehicular planetary gear type step-variable transmission including a first transmission portion and a second transmission portion which are disposed coaxially with a first axis, and wherein a rotary motion of an input rotary member rotated by a drive power source about the first axis is transmitted to said second transmission portion through said first transmission portion, and a rotary motion of an output rotary member rotated about said first axis is transmitted to a drive wheel of a vehicle, characterized by comprising:

a first transmission portion including a first planetary gear set of a double-pinion type having a first carrier connected to said input rotary member and said first intermediate output path, a first ring gear connected to a second intermediate output path a rotary motion of which is decelerated with respect to the rotary motion of said input rotary member at a speed ratio higher than that of said first intermediate output path, and a first sun gear fixed to a stationary member;

a second transmission portion including a second planetary gear set and a third planetary gear set each of which has a sun gear, a carrier and a ring gear, and having four rotary elements each of which is provided by one member or a combination of a plurality of connected members selected from among said sun gears, said carriers and said ring gears of said second and third planetary gear sets, said four rotary elements having respective rotating speeds that are represented along respective four straight lines in a collinear chart, which four straight lines are arranged in a direction from one of opposite ends of the collinear chart toward the other end, said first rotary element being selectively connected through a fourth clutch to said first intermediate output path, selectively connected through a third clutch to said second intermediate output path, and selectively fixed through a first brake to said stationary member, said second rotary member being selectively connected through a second clutch to said first intermediate output path, and selectively fixed through a second brake to said stationary member, said third rotary element being fixed to said output rotary member, and said fourth rotary member being selectively connected through a first clutch to said second intermediate output path; and

a power transmitting member which is disposed rotatably about a

second axis parallel to said first axis and operatively connected to said output rotary member, for transmitting the rotary motion of said output rotary member to said drive wheel,

said vehicular planetary gear type step-variable transmission being installed on the vehicle such that said first axis and said second axis are parallel to a width direction of the vehicle.

2. A vehicular planetary gear type step-variable transmission including a first transmission portion and a second transmission portion which are disposed coaxially with a first axis, and wherein a rotary motion of an input rotary member rotated by a drive power source about the first axis is transmitted to said second transmission portion through said first transmission portion, and a rotary motion of an output rotary member rotated about said first axis is transmitted to a drive wheel of a vehicle, characterized by comprising:

a first transmission portion including a first planetary gear set of a double-pinion type having a first carrier connected to said input rotary member and said first intermediate output path, a first ring gear connected to a second intermediate output path a rotary motion of which is decelerated with respect to the rotary motion of said input rotary member at a speed ratio higher than that of said first intermediate output path, and a first sun gear fixed to a stationary member;

a second transmission portion including a second planetary gear set of a single-pinion type having a second sun gear, a second carrier and a third ring gear, and a third planetary gear set of a double-pinion type having a third sun gear, a third carrier and a third ring gear, said first sun gear being selectively connected through a fourth clutch to said first intermediate output path, selectively connected through a third clutch to said second intermediate output path, and selectively fixed through a first brake to said stationary member, said second carrier and said third carrier being constituted by a common member, selectively connected through a second clutch to said first intermediate output path, and selectively fixed through a second brake to said stationary member, said second ring gear and said third ring gear being constituted by a common member and fixed to said output rotary member, and said third sun gear being selectively connected through a first clutch to said second intermediate output path;

and

a power transmitting member which is disposed rotatably about a second axis parallel to said first axis and operatively connected to said output rotary member, for transmitting the rotary motion of said output rotary member to said drive wheel,

said vehicular planetary gear type step-variable transmission being installed on the vehicle such that said first axis and said second axis are parallel to a width direction of the vehicle.

3. The vehicular planetary gear type step-variable transmission according to claim 1 or 2, which has a plurality of gear positions selected from among:

- a first gear position which is established by engaging said first clutch and said second brake or a one-way clutch and which has a highest speed ratio;

- a second gear position which is established by engaging said first clutch and said first brake and which has a speed ratio lower than that of said first gear position;

- a third gear position which is established by engaging said first clutch and said third clutch and which has a speed ratio lower than that of said second gear position;

- a fourth gear position which is established by engaging said first clutch and said fourth clutch and which has a speed ratio lower than that of said third gear position;

- a fifth gear position which is established by engaging said first clutch and said second clutch and which has a speed ratio lower than that of said fourth gear position;

- a sixth gear position which is established by engaging said second clutch and said fourth clutch and which has a speed ratio lower than that of said fifth gear position;

- a seventh gear position which is established by engaging said second clutch and said third clutch and which has a speed ratio lower than that of said sixth gear position; and

- an eighth gear position which is established by engaging said second clutch and said first brake and which has a speed ratio lower than that of said seventh gear position.

4. The vehicular planetary gear type step-variable transmission according to any one of claims 1-3, wherein said first planetary gear set, said second planetary gear set and said third planetary gear set are disposed in this order of description, coaxially with said first axis,

and wherein said fourth clutch is disposed on one side of said first planetary gear set which is remote from said second planetary gear set, and is connected to said first carrier.

5. The vehicular planetary gear type step-variable transmission according to claim 4, comprising an oil pump which is disposed on one side of said first planetary gear set that is remote from said second planetary gear set and which is rotated by said drive power source to supply a working fluid for engaging said clutches and said brakes,

and wherein said fourth clutch is disposed in a space between said first planetary gear set and said oil pump.

6. The vehicular planetary gear type step-variable transmission according to claim 4 or 5, wherein said stationary member to which said first sun gear of said first planetary gear set is fixed has a cylindrical shape and is disposed radially outwardly of said input rotary member,

and wherein said fourth clutch is disposed in a radially outer space within said stationary member.

7. The vehicular planetary gear type step-variable transmission according to any one of claims 4-6, wherein a fourth clutch piston for forcing friction members of said fourth clutch against each other to engage said fourth clutch is disposed on one side of said friction members which is remote from said first planetary gear set.

8. The vehicular planetary gear type step-variable transmission according to any one of claims 5-7, wherein said fourth clutch piston is disposed on one side of the friction members of said fourth clutch which is on the side of said oil pump.

9. The vehicular planetary gear type step-variable transmission according to any one of claims 4-8, wherein a centrifugal-pressure compensating oil

chamber is provided for said fourth clutch piston, said centrifugal-pressure compensating oil chamber is formed in a space located radially inwardly of the friction members of said fourth clutch.

10. The vehicular planetary gear type step-variable transmission according to any one of claims 4-9, wherein said third clutch has friction members disposed radially outwardly of said first ring gear, and a fourth cylinder of said fourth clutch is disposed in a space located radially inwardly of a third clutch piston provided for forcing the friction members of said third clutch against each other to engage said third clutch, an oil seal being provided between said third clutch piston and said fourth cylinder.

11. The vehicular planetary gear type step-variable transmission according to any one of claims 4-10, wherein an oil chamber for operating said third clutch piston is formed between a third clutch drum of said third clutch and said third clutch piston.

12. The vehicular planetary gear type step-variable transmission according to any one of claims 1-11, wherein said output rotary member is disposed coaxially of said first axis, between said first transmission portion and said second transmission portion.

13. The vehicular planetary gear type step-variable transmission according to any one of claims 1-12, wherein said second planetary gear set and said third planetary gear set constitute a planetary gear train of Ravigneaux type.

14. The vehicular planetary gear type step-variable transmission according to any one of claims 1, and 3-13, wherein said third planetary gear set is of a double-pinion type.